



SEQUENCE LISTING

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Potter, Robert J.
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Gerard, Gary F.
Rosenthal, Kim

<120> Thermostable Reverse Transcriptases and Uses Thereof

<130> 0942.5040001/RWE/AWL

<140> US 09/845,157

<141> 2001-05-01

<150> US 60/207,196

<151> 2000-05-26

<160> 8

<170> PatentIn version 3.0

<210> 1

<211> 2151

<212> DNA

<213> Moloney-Murine Leukemia Virus

<220>

<221> CDS

<222> (1) .. (2151)

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atg acc cta aat ata gaa gat gag tat cgg cta cat gag acc tca aaa	144
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Tyr Pro Met Ser Gln Glu Ala Arg Leu Gly Ile Lys Pro His Ile Gln	
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Arg Leu Leu Asp Gln Gly Ile Leu Val Pro Cys Gln Ser Pro Trp Asn	
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Thr Pro Leu Leu Pro Val Lys Lys Pro Gly Thr Asn Asp Tyr Arg Pro	
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gtc caa gat ctg aga gag gtc aac aaa cgc gta gaa gac atc cac ccc	480
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Thr Val Pro Asn Pro Tyr Asn Leu Leu Ser Gly Leu Pro Pro Ser His	
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Gln Trp Tyr Thr Val Leu Asp Leu Lys Asp Ala Phe Phe Cys Leu Arg	
180 185 190	
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Leu His Pro Thr Ser Gln Pro Leu Phe Ala Phe Glu Trp Arg Asp Pro	
195 200 205	
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Glu Met Gly Ile Ser Gly Gln Leu Thr Trp Thr Arg Leu Pro Gln Gly	
210 215 220	
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Phe Lys Asn Ser Pro Thr Leu Phe Asp Glu Ala Leu Arg Arg Asp Leu	
225 230 235 240	
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Ala Asp Phe Arg Ile Gln His Pro Asp Leu Ile Leu Leu Gln Tyr Val	
245 250 255	
gat gac tta ctg ctg gcc gcc act tct gag ctc gac tgc caa caa ggt	816
Asp Asp Leu Leu Leu Ala Ala Thr Ser Glu Leu Asp Cys Gln Gln Gly	
260 265 270	
act cgg gcc ctg tta caa acc cta gga gac ctc ggg tat cgg gcc tcg	864
Thr Arg Ala Leu Leu Gln Thr Leu Gly Asp Leu Gly Tyr Arg Ala Ser	
275 280 285	
gcc aag aaa gcc caa att tgc cag aaa cag gtc aag tat ctg ggg tat	912
Ala Lys Lys Ala Gln Ile Cys Gln Lys Gln Val Lys Tyr Leu Gly Tyr	
290 295 300	

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305					310					315					320	
gtg	atg	ggg	cag	cct	act	ccg	aag	acc	ccg	cgg	caa	cta	agg	gag	ttc	1008
Val	Met	Gly	Gln	Pro	Thr	Pro	Lys	Thr	Pro	Arg	Gln	Leu	Arg	Glu	Phe	
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cta	ggg	acg	gca	ggc	ttc	tgt	cgc	ctc	tgg	atc	cct	ggg	ttt	gca	gaa	1056
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atg	gca	gcc	ccc	ttg	tac	cct	ctc	acc	aaa	acg	ggg	act	ctg	ttt	aat	1104
Met	Ala	Ala	Pro	Leu	Tyr	Pro	Leu	Thr	Lys	Thr	Gly	Thr	Leu	Phe	Asn	
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tgg	ggc	cca	gac	caa	caa	aag	gcc	tat	caa	gaa	atc	aag	caa	gct	ctt	1152
Trp	Gly	Pro	Asp	Gln	Gln	Lys	Ala	Tyr	Gln	Glu	Ile	Lys	Gln	Ala	Leu	
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aaa	ctg	gga	cct	tgg	cgt	cgg	ccg	gtg	gcc	tac	ctg	tcc	aaa	aag	cta	1296
Lys	Leu	Gly	Pro	Trp	Arg	Arg	Pro	Val	Ala	Tyr	Leu	Ser	Lys	Lys	Leu	
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gac	cca	gta	gca	gct	ggg	tgg	ccc	cct	tgc	cta	cgg	atg	gta	gca	gcc	1344
Asp	Pro	Val	Ala	Ala	Gly	Trp	Pro	Pro	Cys	Leu	Arg	Met	Val	Ala	Ala	
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Ile	Ala	Val	Leu	Thr	Lys	Asp	Ala	Gly	Lys	Leu	Thr	Met	Gly	Gln	Pro	
	450					455					460					
cta	gtc	att	ctg	gcc	ccc	cat	gca	gta	gag	gca	cta	gtc	aaa	caa	ccc	1440
Leu	Val	Ile	Leu	Ala	Pro	His	Ala	Val	Glu	Ala	Leu	Val	Lys	Gln	Pro	
465					470					475					480	
ccc	gat	cga	tgg	ctt	tcc	aac	gcc	cgg	atg	act	cac	tat	cag	gcc	ttg	1488
Pro	Asp	Arg	Trp	Leu	Ser	Asn	Ala	Arg	Met	Thr	His	Tyr	Gln	Ala	Leu	
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ctt	ttg	gac	acg	gac	cgg	gtc	cag	ttc	gga	ccg	gtg	gta	gcc	ctg	aac	1536
Leu	Leu	Asp	Thr	Asp	Arg	Val	Gln	Phe	Gly	Pro	Val	Val	Ala	Leu	Asn	
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Pro	Ala	Thr	Leu	Leu	Pro	Leu	Pro	Glu	Glu	Gly	Leu	Gln	His	Asn	Cys	
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Gln	Pro	Leu	Pro	Asp	Ala	Asp	His	Thr	Trp	Tyr	Thr	Gly	Gly	Ser	Ser	
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Thr	Glu	Val	Ile	Trp	Ala	Lys	Ala	Leu	Pro	Ala	Gly	Thr	Ser	Ala	Gln	
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Arg	Ala	Gln	Leu	Ile	Ala	Leu	Thr	Gln	Ala	Leu	Arg	Met	Ala	Glu	Gly	
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His	Ile	His	Gly	Glu	Ile	Tyr	Arg	Arg	Arg	Gly	Leu	Leu	Thr	Ser	Glu	
625					630					635					640	
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Gly	Lys	Glu	Ile	Lys	Asn	Lys	Asp	Glu	Ile	Leu	Ala	Leu	Leu	Lys	Ala	
				645					650					655		
ctc	ttt	ctg	ccc	aaa	aga	ctt	agc	ata	atc	cat	tgt	cca	gga	cat	caa	2016
Leu	Phe	Leu	Pro	Lys	Arg	Leu	Ser	Ile	Ile	His	Cys	Pro	Gly	His	Gln	
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Lys	Gly	His	Ser	Ala	Glu	Ala	Arg	Gly	Asn	Arg	Met	Ala	Asp	Gln	Ala	
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gcc	cga	aag	gca	gcc	atc	aca	gag	aat	cca	gac	acc	tct	acc	ctc	ctc	2112
Ala	Arg	Lys	Ala	Ala	Ile	Thr	Glu	Asn	Pro	Asp	Thr	Ser	Thr	Leu	Leu	
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ata	gaa	aat	tca	tca	ccc	aat	tcc	cgc	tta	att	aat	taa				2151
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 <213> Moloney-Murine Leukemia Virus

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Met	Thr	Leu	Asn	Ile	Glu	Asp	Glu	Tyr	Arg	Leu	His	Glu	Thr	Ser	Lys		
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Glu	Pro	Asp	Val	Ser	Leu	Gly	Ser	Thr	Trp	Leu	Ser	Asp	Phe	Pro	Gln		
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Ala	Trp	Ala	Glu	Thr	Gly	Gly	Met	Gly	Leu	Ala	Val	Arg	Gln	Ala	Pro		
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Arg	Leu	Leu	Asp	Gln	Gly	Ile	Leu	Val	Pro	Cys	Gln	Ser	Pro	Trp	Asn		
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Gln	Trp	Tyr	Thr	Val	Leu	Asp	Leu	Lys	Asp	Ala	Phe	Phe	Cys	Leu	Arg		
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Leu	His	Pro	Thr	Ser	Gln	Pro	Leu	Phe	Ala	Phe	Glu	Trp	Arg	Asp	Pro		
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Ala	Asp	Phe	Arg	Ile	Gln	His	Pro	Asp	Leu	Ile	Leu	Leu	Gln	Tyr	Val		
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Asp	Asp	Leu	Leu	Leu	Ala	Ala	Thr	Ser	Glu	Leu	Asp	Cys	Gln	Gln	Gly		
			260					265					270				
Thr	Arg	Ala	Leu	Leu	Gln	Thr	Leu	Gly	Asp	Leu	Gly	Tyr	Arg	Ala	Ser		
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Ala	Lys	Lys	Ala	Gln	Ile	Cys	Gln	Lys	Gln	Val	Lys	Tyr	Leu	Gly	Tyr		
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Met	Ala	Ala	Pro	Leu	Tyr	Pro	Leu	Thr	Lys	Thr	Gly	Thr	Leu	Phe	Asn	355	360	365	
Trp	Gly	Pro	Asp	Gln	Gln	Lys	Ala	Tyr	Gln	Glu	Ile	Lys	Gln	Ala	Leu	370	375	380	
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Leu	Leu	Asp	Thr	Asp	Arg	Val	Gln	Phe	Gly	Pro	Val	Val	Ala	Leu	Asn	500	505	510	
Pro	Ala	Thr	Leu	Leu	Pro	Leu	Pro	Glu	Glu	Gly	Leu	Gln	His	Asn	Cys	515	520	525	
Leu	Asp	Ile	Leu	Ala	Glu	Ala	His	Gly	Thr	Arg	Pro	Asp	Leu	Thr	Asp	530	535	540	
Gln	Pro	Leu	Pro	Asp	Ala	Asp	His	Thr	Trp	Tyr	Thr	Gly	Gly	Ser	Ser	545	550	555	560
Leu	Leu	Gln	Glu	Gly	Gln	Arg	Lys	Ala	Gly	Ala	Ala	Val	Thr	Thr	Glu	565	570	575	
Thr	Glu	Val	Ile	Trp	Ala	Lys	Ala	Leu	Pro	Ala	Gly	Thr	Ser	Ala	Gln	580	585	590	
Arg	Ala	Gln	Leu	Ile	Ala	Leu	Thr	Gln	Ala	Leu	Arg	Met	Ala	Glu	Gly	595	600	605	
Lys	Lys	Leu	Asn	Val	Tyr	Thr	Asn	Ser	Arg	Tyr	Ala	Phe	Ala	Thr	Ala				

610	615	620
His Ile His Gly Glu Ile Tyr Arg Arg Arg Gly Leu Leu Thr Ser Glu 625 630 635 640		
Gly Lys Glu Ile Lys Asn Lys Asp Glu Ile Leu Ala Leu Leu Lys Ala 645 650 655		
Leu Phe Leu Pro Lys Arg Leu Ser Ile Ile His Cys Pro Gly His Gln 660 665 670		
Lys Gly His Ser Ala Glu Ala Arg Gly Asn Arg Met Ala Asp Gln Ala 675 680 685		
Ala Arg Lys Ala Ala Ile Thr Glu Asn Pro Asp Thr Ser Thr Leu Leu 690 695 700		
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gctatgacca tgattacgcc aagcttgcac gcctgcaggt cgactctaga ggatccccgg 180
gtaccgagct cgaattcact ggccgctcgtt ttacaacgtc gtgactggga aaaccctggc 240
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Glu Pro Asp Val Ser Leu Gly Ser Thr Trp Leu Ser Asp Phe Pro Gln
20 25 30
gcc tgg gcg gaa acc ggg ggc atg gga ctg gca gtt cgc caa gct cct 144
Ala Trp Ala Glu Thr Gly Gly Met Gly Leu Ala Val Arg Gln Ala Pro
35 40 45
ctg atc ata cct ctg aaa gca acc tct acc ccc gtg tcc ata aaa caa 192
Leu Ile Ile Pro Leu Lys Ala Thr Ser Thr Pro Val Ser Ile Lys Gln
50 55 60
tac ccc atg tca caa gaa gcc aga ctg ggg atc aag ccc cac ata cag 240
Tyr Pro Met Ser Gln Glu Ala Arg Leu Gly Ile Lys Pro His Ile Gln
65 70 75 80
aga ctg ttg gac cag gga ata ctg gta ccc tgc cag tcc ccc tgg aac 288

Arg	Leu	Leu	Asp	Gln	Gly	Ile	Leu	Val	Pro	Cys	Gln	Ser	Pro	Trp	Asn	
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acg	ccc	ctg	cta	ccc	gtt	aag	aaa	cca	ggg	act	aat	gat	tat	agg	cct	336
Thr	Pro	Leu	Leu	Pro	Val	Lys	Lys	Pro	Gly	Thr	Asn	Asp	Tyr	Arg	Pro	
			100					105					110			
gtc	cag	gat	ctg	aga	gaa	gtc	aac	aag	cgg	gtg	gaa	gac	atc	cac	ccc	384
Val	Gln	Asp	Leu	Arg	Glu	Val	Asn	Lys	Arg	Val	Glu	Asp	Ile	His	Pro	
			115					120					125			
acc	gtg	ccc	aac	cct	tac	aac	ctc	ttg	agc	ggg	ctc	cca	ccg	tcc	cac	432
Thr	Val	Pro	Asn	Pro	Tyr	Asn	Leu	Leu	Ser	Gly	Leu	Pro	Pro	Ser	His	
			130				135					140				
cag	tgg	tac	act	gtg	ctt	gat	tta	aag	gat	gcc	ttt	ttc	tgc	ctg	aga	480
Gln	Trp	Tyr	Thr	Val	Leu	Asp	Leu	Lys	Asp	Ala	Phe	Phe	Cys	Leu	Arg	
145					150					155					160	
ctc	cac	ccc	acc	agt	cag	cct	ctc	ttc	gcc	ttt	gag	tgg	aga	gat	cca	528
Leu	His	Pro	Thr	Ser	Gln	Pro	Leu	Phe	Ala	Phe	Glu	Trp	Arg	Asp	Pro	
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gag	atg	gga	atc	tca	gga	caa	ttg	acc	tgg	acc	aga	ctc	cca	cag	ggt	576
Glu	Met	Gly	Ile	Ser	Gly	Gln	Leu	Thr	Trp	Thr	Arg	Leu	Pro	Gln	Gly	
			180					185					190			
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Phe	Lys	Asn	Ser	Pro	Thr	Leu	Phe	Asp	Glu	Ala	Leu	His	Arg	Asp	Leu	
		195					200						205			
gca	gac	ttc	cgg	atc	cag	cac	cca	gac	ttg	atc	ctg	cta	cag	tac	gtg	672
Ala	Asp	Phe	Arg	Ile	Gln	His	Pro	Asp	Leu	Ile	Leu	Leu	Gln	Tyr	Val	
		210					215					220				
gat	gac	tta	ctg	ctg	gcc	gcc	act	tct	gag	cta	gac	tgc	caa	caa	ggt	720
Asp	Asp	Leu	Leu	Leu	Ala	Ala	Thr	Ser	Glu	Leu	Asp	Cys	Gln	Gln	Gly	
225					230					235					240	
act	cgg	gcc	ctg	tta	caa	acc	cta	ggg	aac	ctc	ggg	tat	cgg	gcc	tcg	768
Thr	Arg	Ala	Leu	Leu	Gln	Thr	Leu	Gly	Asn	Leu	Gly	Tyr	Arg	Ala	Ser	
				245					250					255		
gcc	aag	aaa	gcc	caa	att	tgc	cag	aaa	cag	gtc	aag	tat	ctg	ggg	tat	816
Ala	Lys	Lys	Ala	Gln	Ile	Cys	Gln	Lys	Gln	Val	Lys	Tyr	Leu	Gly	Tyr	
			260					265					270			
ctt	cta	aaa	gag	ggt	cag	aga	tgg	ctg	act	gag	gcc	aga	aaa	gag	act	864
Leu	Leu	Lys	Glu	Gly	Gln	Arg	Trp	Leu	Thr	Glu	Ala	Arg	Lys	Glu	Thr	
		275					280					285				
gtg	atg	ggg	cag	cct	act	ccg	aag	acc	cct	cga	caa	cta	agg	gag	ttc	912
Val	Met	Gly	Gln	Pro	Thr	Pro	Lys	Thr	Pro	Arg	Gln	Leu	Arg	Glu	Phe	
		290					295				300					
cta	ggg	acg	gca	ggc	ttc	tgt	cgc	ctc	tgg	atc	cct	ggg	ttt	gca	gaa	960
Leu	Gly	Thr	Ala	Gly	Phe	Cys	Arg	Leu	Trp	Ile	Pro	Gly	Phe	Ala	Glu	

305	310	315	320	
atg gca gcc ccc ttg tac cct ctc acc aaa acg ggg act ctg ttt aat				1008
Met Ala Ala Pro Leu Tyr Pro Leu Thr Lys Thr Gly Thr Leu Phe Asn	325	330	335	
tgg ggc cca gac caa caa aag gcc tat caa gaa atc aag caa gct ctt				1056
Trp Gly Pro Asp Gln Gln Lys Ala Tyr Gln Glu Ile Lys Gln Ala Leu	340	345	350	
cta act gcc cca gcc ctg ggg ttg cca gat ttg act aag ccc ttt gaa				1104
Leu Thr Ala Pro Ala Leu Gly Leu Pro Asp Leu Thr Lys Pro Phe Glu	355	360	365	
ctc ttt gtc gac gag aag cag ggc tac gcc aaa ggt gtc cta acg caa				1152
Leu Phe Val Asp Glu Lys Gln Gly Tyr Ala Lys Gly Val Leu Thr Gln	370	375	380	
aaa ctg gga cct tgg cgt cgg ccg gtg gcc tac ctg tcc aaa aag cta				1200
Lys Leu Gly Pro Trp Arg Arg Pro Val Ala Tyr Leu Ser Lys Lys Leu	385	390	400	
gac cca gta gca gct ggg tgg ccc cct tgc cta cgg atg gta gca gcc				1248
Asp Pro Val Ala Ala Gly Trp Pro Pro Cys Leu Arg Met Val Ala Ala	405	410	415	
att gcc gta ctg aca aag gat gca ggc aag cta acc atg gga cag cca				1296
Ile Ala Val Leu Thr Lys Asp Ala Gly Lys Leu Thr Met Gly Gln Pro	420	425	430	
cta gtc att ctg gcc ccc cat gca gta gag gca cta gtc aaa caa ccc				1344
Leu Val Ile Leu Ala Pro His Ala Val Glu Ala Leu Val Lys Gln Pro	435	440	445	
ccc gac cgc tgg ctt tcc aac gcc cgg atg act cac tat cag gcc ttg				1392
Pro Asp Arg Trp Leu Ser Asn Ala Arg Met Thr His Tyr Gln Ala Leu	450	455	460	
ctt ttg gac acg gac cgg gtc cag ttc gga ccg gtg gta gcc ctg aac				1440
Leu Leu Asp Thr Asp Arg Val Gln Phe Gly Pro Val Val Ala Leu Asn	465	470	480	
ccg gct acg ctg ctc cca ctg cct gag gaa ggg ctg caa cac aac tgc				1488
Pro Ala Thr Leu Leu Pro Leu Pro Glu Glu Gly Leu Gln His Asn Cys	485	490	495	
ctt gat aat tcc cgc tta att aat taa				1515
Leu Asp Asn Ser Arg Leu Ile Asn	500			

<210> 8
 <211> 504
 <212> PRT
 <213> Moloney-Murine Leukemia Virus

<400> 8

Met	Thr	Leu	Asn	Ile	Glu	Asp	Glu	His	Arg	Leu	His	Glu	Thr	Ser	Lys	
1				5					10					15		
Glu	Pro	Asp	Val	Ser	Leu	Gly	Ser	Thr	Trp	Leu	Ser	Asp	Phe	Pro	Gln	
			20					25					30			
Ala	Trp	Ala	Glu	Thr	Gly	Gly	Met	Gly	Leu	Ala	Val	Arg	Gln	Ala	Pro	
		35					40					45				
Leu	Ile	Ile	Pro	Leu	Lys	Ala	Thr	Ser	Thr	Pro	Val	Ser	Ile	Lys	Gln	
	50					55					60					
Tyr	Pro	Met	Ser	Gln	Glu	Ala	Arg	Leu	Gly	Ile	Lys	Pro	His	Ile	Gln	
65					70					75					80	
Arg	Leu	Leu	Asp	Gln	Gly	Ile	Leu	Val	Pro	Cys	Gln	Ser	Pro	Trp	Asn	
				85					90					95		
Thr	Pro	Leu	Leu	Pro	Val	Lys	Lys	Pro	Gly	Thr	Asn	Asp	Tyr	Arg	Pro	
			100					105					110			
Val	Gln	Asp	Leu	Arg	Glu	Val	Asn	Lys	Arg	Val	Glu	Asp	Ile	His	Pro	
		115					120					125				
Thr	Val	Pro	Asn	Pro	Tyr	Asn	Leu	Leu	Ser	Gly	Leu	Pro	Pro	Ser	His	
	130					135					140					
Gln	Trp	Tyr	Thr	Val	Leu	Asp	Leu	Lys	Asp	Ala	Phe	Phe	Cys	Leu	Arg	
145					150					155					160	
Leu	His	Pro	Thr	Ser	Gln	Pro	Leu	Phe	Ala	Phe	Glu	Trp	Arg	Asp	Pro	
				165					170					175		
Glu	Met	Gly	Ile	Ser	Gly	Gln	Leu	Thr	Trp	Thr	Arg	Leu	Pro	Gln	Gly	
			180					185					190			
Phe	Lys	Asn	Ser	Pro	Thr	Leu	Phe	Asp	Glu	Ala	Leu	His	Arg	Asp	Leu	
		195					200					205				
Ala	Asp	Phe	Arg	Ile	Gln	His	Pro	Asp	Leu	Ile	Leu	Leu	Gln	Tyr	Val	
	210					215					220					
Asp	Asp	Leu	Leu	Leu	Ala	Ala	Thr	Ser	Glu	Leu	Asp	Cys	Gln	Gln	Gly	
225					230					235					240	
Thr	Arg	Ala	Leu	Leu	Gln	Thr	Leu	Gly	Asn	Leu	Gly	Tyr	Arg	Ala	Ser	
				245					250					255		
Ala	Lys	Lys	Ala	Gln	Ile	Cys	Gln	Lys	Gln	Val	Lys	Tyr	Leu	Gly	Tyr	
			260					265					270			
Leu	Leu	Lys	Glu	Gly	Gln	Arg	Trp	Leu	Thr	Glu	Ala	Arg	Lys	Glu	Thr	
		275					280					285				
Val	Met	Gly	Gln	Pro	Thr	Pro	Lys	Thr	Pro	Arg	Gln	Leu	Arg	Glu	Phe	
	290					295					300					

Leu Gly Thr Ala Gly Phe Cys Arg Leu Trp Ile Pro Gly Phe Ala Glu
 305 310 315 320
 Met Ala Ala Pro Leu Tyr Pro Leu Thr Lys Thr Gly Thr Leu Phe Asn
 325 330 335
 Trp Gly Pro Asp Gln Gln Lys Ala Tyr Gln Glu Ile Lys Gln Ala Leu
 340 345 350
 Leu Thr Ala Pro Ala Leu Gly Leu Pro Asp Leu Thr Lys Pro Phe Glu
 355 360 365
 Leu Phe Val Asp Glu Lys Gln Gly Tyr Ala Lys Gly Val Leu Thr Gln
 370 375 380
 Lys Leu Gly Pro Trp Arg Arg Pro Val Ala Tyr Leu Ser Lys Lys Leu
 385 390 395 400
 Asp Pro Val Ala Ala Gly Trp Pro Pro Cys Leu Arg Met Val Ala Ala
 405 410 415
 Ile Ala Val Leu Thr Lys Asp Ala Gly Lys Leu Thr Met Gly Gln Pro
 420 425 430
 Leu Val Ile Leu Ala Pro His Ala Val Glu Ala Leu Val Lys Gln Pro
 435 440 445
 Pro Asp Arg Trp Leu Ser Asn Ala Arg Met Thr His Tyr Gln Ala Leu
 450 455 460
 Leu Leu Asp Thr Asp Arg Val Gln Phe Gly Pro Val Val Ala Leu Asn
 465 470 475 480
 Pro Ala Thr Leu Leu Pro Leu Pro Glu Glu Gly Leu Gln His Asn Cys
 485 490 495
 Leu Asp Asn Ser Arg Leu Ile Asn
 500